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(54) **A process to eliminate lead in gasoline with a high octane number.**

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GB-A- 386 627
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Description

The present invention relates to a process for the production of improved gasoline which is lead-free, and represents a particularly improved technology from the point of view of production economy.

Background of the Invention

The current trend of engine manufacturers is to increase the engine compression ratio in order to obtain increased power together with a reduction in fuel consumption. This requires a gasoline with a very high anti-knock tendency.

Gasoline is a mixture of hydrocarbons with a tremendously variable tendency for knocking. To avoid this problem and consequently raise the octane number as close as possible to 100 (in the case of mixtures of purely isooctane gasolines), anti-knock compounds such as tetraethyl-lead and tetramethyl-lead have been used.

Although these products have proved to have the best performance with regard to their cost/effectiveness ratio, they have generated very important atmospheric pollution problems.

For this reason, the legislation of most industrial countries envisage an even greater reduction of lead levels in gasoline, with total elimination foreseen by the beginning of next decade.

Batches of non-lead gasoline sold so far on the market have not managed to satisfy users because of their very low anti-knock tendency. On the other hand, obtaining up-graded gasoline using cracking and similar processes would result in price increases due to the large investments required, which could hardly be absorbed by small refineries.

On the other hand, catalytic filters are very expensive in proportion to their short life, reduce engine power, and at the same time considerably increase fuel consumption.

However, this invention will allow up-graded gasoline, as required by the market, to be produced by a simple method and low cost.

Description of preferred Embodiments

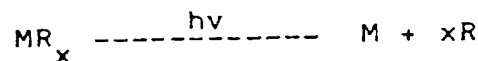
So, the present invention has for object a process to eliminate lead from gasoline with a high octane number containing organometallic lead additives, characterized in that said gasoline is subjected at room temperature and pressure to irradiation using U.V. rays with a wavelength between 2.000 and 5.000 Å to provoke the formation of free radicals, in the presence of halogen compounds

derived from ethylene dibromide and ethylene dichloride which favour the precipitation of the lead in the form of insoluble lead halogenates, and the resulting lead is separated by filtration.

As per this process gasoline, additioned with Tetra-ethyl-lead, "Pb(C₂H₅)₄", or tetramethyl-lead, "Pb(CH₃)₄", in amounts required to obtain a higher octane number, is irradiated at room temperature and pressure with U.V. rays obtained from a Mercury vapour lamp. The organometallic compound is consequently decomposed by Quanta of light and precipitates as lead compounds which can be eliminated by filtration.

The action of the U. V. rays consists in a photo-chemical reaction with the resulting formation of free organometallic radicals which eliminate "moloxydes" in fuel.

The reaction is carried out following Einstein's Law, as follows:



in which:

M = metal

R = alkyl radical

h = Planck's constant

ν = Wavelength (in Å).

The present process of adding tetraethyl-lead or tetramethyl-lead generates free radicals through thermal decomposition in the engine pistons, which act on the "moloxydes" present in the gasoline.

According to the present invention, the free radicals are generated by the U.V. rays, at room temperature and pressure, acting on the gasoline, with the reduction action being effected before the use of the gasoline. In this manner the lead becomes insoluble in the gasoline, hence its elimination through filtration, resulting in their not being found in the exhaust gases of the engines and at the same time obtaining 100 octane fuel.

The radiant energy may be supplied favourably either in continuous manner or in intermitent sequence. It may also be supplied in the form of a laser beam.

Tetraethyl-lead or tetramethyl-lead are mixed with halogen compounds derived from ethylene dibromide, C₂H₄Br₂ and ethylene dichloride, C₂H₄Cl₂, in a manner already known, and which are decomposed by U.V. rays and which act as sensitizers which favour the elimination of lead in the form of halogenate compounds.

The reaction may be brought about by using any photo-sensitive compound, with the formation of free radicals with reduction action.

The reaction may be effected both in liquid and in gaseous form. The precipitated metal may be

recovered afterwards by filtration.

The process of the present invention is exemplified hereinafter, said example not to be taken as a limitation of the coverage of this invention.

Example

A gasoline with 80 octane number (NO RM - Research Method), loaded with tetraethyl lead having a lead content of 0.8 g/l. approximately, is subjected to irradiation either in continuous or pulsating manner, with ultraviolet rays having a wavelength of between 2,000 to 5,000 Å, to precipitate the lead in the form of halogenates.

The gasoline thus treated has an octane number of 100 and is absolutely lead-free.

The reaction is instantaneous and the overall quantum yield very high.

The increase in lead, as compared with the amount cited priorly, can produce a gasoline with an octane number even higher than 100.

Claims

1. A process to eliminate lead from gasoline with a high octane number containing organometallic lead additives, characterized in that said gasoline is subjected at room temperature and pressure to irradiation using U.V. rays with a wavelength between 2.000 and 5.000 Å to provoke the formation of free radicals, in the presence of halogen compounds derived from ethylene dibromide and ethylene dichloride which favour the precipitation of the lead in the form of insoluble lead halogenates, and the resulting lead is separated by filtration.
2. A process according to claim 1 wherein the irradiation is effected either in continuous or in pulsating manner.
3. A process according to claim 1 wherein the irradiation is effected with laser.
4. A process according to claim 1 wherein sunlight is used as the irradiation energy, optionally in combination with another source of light energy.
5. A process according to claim 1 wherein the process is effected both in liquid and in gaseous form.

Revendications

1. Un procédé destiné à éliminer le plomb de l'essence avec un indice d'octane élevé contenant des additifs de plomb organométalliques, caractérisé en ce que ladite essence est soumise à une température et une pression ambiantes à une irradiation utilisant des rayons U.V. avec une longueur d'onde comprise entre 2.000 et 5.000 angströms pour provoquer la formation de radicaux libres, en présence de composés halogènes dérivés de dibromure d'éthylène et de dichlorure d'éthylène qui favorisent la précipitation du plomb sous forme d'halogénures de plomb insolubles, et le plomb en résultant est séparé par filtration.
2. Un procédé conforme à la revendication 1 dans lequel l'irradiation est effectuée de manière continue ou pulsatoire.
3. Un procédé conforme à la revendication 1 dans lequel l'irradiation est effectuée par laser.
4. Un procédé conforme à la revendication 1 dans lequel la lumière du soleil est utilisée comme énergie rayonnante, optionnellement en combinaison avec une autre source d'énergie lumineuse.
5. Un procédé conforme à la revendication 1 dans lequel le procédé est effectué à la fois sous forme liquide et gazeuse.

Ansprüche

1. Verfahren zum Entfernen von Blei aus einem Treibstoff mit hoher Oktanzahl, enthaltend Organometallbleiadditive, **dadurch gekennzeichnet**, daß der Treibstoff bei Raumtemperatur und Druck einer Bestrahlung unter Verwendung von UV-Strahlen mit einer Wellenlänge zwischen 2000 und 5000 Å in der Gegenwart von Halogenverbindungen, die von Ethylendibromid und Ethylendichlorid abgeleitet sind, ausgesetzt wird, um die Bildung von freien Radikalen zu fördern, die die Präzipitation des Bleis in Form von unlöslichen Bleihalogenverbindungen begünstigen, und das entstandene Blei wird durch Filtration abgetrennt.
2. Verfahren nach Anspruch 1, **dadurch gekennzeichnet**, daß die Bestrahlung entweder auf kontinuierliche oder auf pulsierende Weise bewirkt wird.
3. Verfahren nach Anspruch 1, **dadurch gekennzeichnet**, daß die Bestrahlung durch einen

Laser bewirkt wird.

4. Verfahren nach Anspruch 1, **dadurch gekennzeichnet**, daß Sonnenlicht als Bestrahlungsenergie verwendet wird, gegebenenfalls in Verbindung mit einer anderen Quelle an Lichtenergie. 5
5. Verfahren nach Anspruch 1, **dadurch gekennzeichnet**, daß das Verfahren sowohl in flüssiger wie in gasförmiger Form bewirkt wird. 10

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